UNSW AUSTRALIA

Course Outline

Semester 2 2015

Never Stand Still | Engineering | Mechanical and Manufacturing Engineering

GSOE9810

PRODUCT AND PROCESS QUALITY IN ENGINEERING

Contents

1. Staff Contact Details

Contact details and consultation times for course convenor

Dr Erik van Voorthuysen
Electrical Building G17, Room 414
Tel: (02) 9385 4147
Email: erikv@unsw.edu.au

Consultation concerning this course is available immediately after the classes. Direct consultation requires prior booking via email.

Contact details and consultation times for additional lecturers/demonstrators/lab staff

Dr Ronald Chan
Electrical Building G17, Room 414
Tel: (02) 9385 4147
Email: ting.chan@unsw.edu.au

2. Course details

Credit Points:

This is a 6 unit-of-credit (UoC) course, and involves 3 hours per week (h/w) of face-to-face contact.

The UNSW website states “The normal workload expectations of a student are approximately 25 hours per semester for each UoC, including class contact hours, other learning activities, preparation and time spent on all assessable work. Thus, for a full-time enrolled student, the normal workload, averaged across the 16 weeks of teaching, study and examination periods, is about 37.5 hours per week.”

This means that you should aim to spend about 9 h/w on this course. The additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

There is no parallel teaching in this course.

Contact Hours

Lectures	**Day**	**Time**	**Location**
Week 1 to 13	Tuesday	6pm – 7:30pm	CLB6
Demonstrations			
Week 1 to 13	Tuesday	7:30pm – 9pm	CLB6

Summary of the Course

This course will introduce you to the cornerstones of creating and sustaining an effective organisation by covering several quality engineering approaches, industrial cases, videos etc. Several topics as well as methods and tools for improved product and process design will be covered which are essential to take organisations into the next generation with significantly improved organisational effectiveness. Managing quality is considered critical in business and organizational governance and this includes all aspects of the engineering discipline, from analysis to design to implementation and improvement. GSOE9810 can therefore be considered an important and logical element of a graduate engineering degree or diploma.

Aims of the Course

This course is designed to cover the core concepts and dynamic approaches in quality engineering field. They do not simply reiterate the textbooks, but build on the lecture topics using examples (many taken from several industries) to show you how successfully and unsuccessfully these approaches are applied in practice.

Demonstrations are designed to support your learning process with opportunities for more interaction as well as to enhance individual and team participation through discussion on demonstration problems, questions and cases.

The textbooks, notes, case studies and Moodle postings support the lectures and demonstrations but they are not intended to be a substitute for attending classes. You are expected to cover all the materials assigned for both lectures and demonstrations.

Student learning outcomes

This course is designed to address the below learning outcomes and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

After successfully completing this course, you should be able to:

Learning Outcome		**EA Stage 1 Competencies**
1.	State what an organisation needs to do to remain competitive in today's manufacturing environment.	PE3.1, PE3.2, PE3.6
2.	State how an organisation can improve its processes and integrate its several functions through the best use of quality engineering.	PE2.1, PE2.2, PE2.3
3.	Be able to determine whether a process is capable of producing a product or service to specifications	PE1.1, PE1.2, PE1.6
4.	Be able to integrate very popular topics like total quality management, Six-Sigma, and Benchmarking into organisations.	PE1.1, PE1.2, PE1.6

3. Teaching strategies

Lectures, demonstrations and assessments in the course are designed to cover the core knowledge areas in Quality Engineering. They do not simply reiterate the texts, but build on the lecture topics using examples and cases taken directly from industry to show how the theory is applied in practice and the details of when, where and how it should be applied.

Lectures and demonstrations are designed to develop several graduate attributes by creating an environment where information sharing, discussions, teamwork, communication, task completions and project role playing will take place. Since each of you may have come from a different professional and academic background, your experiences are drawn on to illustrate various aspects of cases covered, and this helps to increase motivation and engagement.

A team of around four to six students in Moodle will be set and each team will be assigned to a two case assignments. Your lecturers have access to your team's discussions will offer guidance when and where necessary. A mixture of activities may include: Case role-plays, individual allocation to particular questions and several other activities to enhance your learning experience.

Lecturers will provide you with feedback and discussion on the assignment, and to understand the concepts and problems in greater depth.

4. Course schedule

Topic	Date	Location	Lecture Content	Demonstration/Lab Content	Suggested Readings
Introduction to quality engineering	28/7/15	CLB6	Different perspectives on quality, issue analysis	Instruction for self-enroll system on Moodle, Q&A for students	Chapter 1 of the prescribed text
Quality theory	4/8/15	CLB6	Key contributors to quality theory, key factor for success	FedEx case study and discussion	Chapter 2 of the prescribed text
Global supply chain quality	11/8/15	CLB6	The Malcolm Baldrige award, the Deming prize	Honeywell case study and discussion	Chapter 3 of the prescribed text
Quality standard and strategic quality planning	18/8/15	CLB6	ISO 9000, quality as a strategy	Aston Martin Cygney case study and discussion	Chapter 4 of the prescribed text

Voice of the customer and the market	25/8/15	CLB6	Quality function deployment and benchmarking	Proto Labs QFD exercise	Chapter 5 and 6 of the prescribed text
Quality in product and process design	1/9/15	CLB6	The 'V' design model, axiomatic design	Ames Rubber Corp. case study and discussion	Chapter 7 of the prescribed text
Managing supplier quality in the supply chain	8/9/15	CLB6	Supply chain analysis, fault tree analysis	Exercise on constructing a fault tree for a generic food product	Chapter 9 of the prescribed text
Acceptance sampling	15/9/15	CLB6	Probability distribution theory, operating characteristic curves	Exercise on constructing and analysing operating characteristic curves	Chapter link will be available on Moodle
Variable control charts	22/9/15	CLB6	x-bar chart, R chart, s chart X chart, median chart	Exercise on constructing and analysing variable control charts	Chapter 10 and 11 of the prescribed text
Attribute control charts	6/10/15	CLB6	p chart, np chart, c chart, u chart	Exercise on constructing and analysing attribute control charts	Chapter 12 of the prescribed text
Six-Sigma management and tools	13/10/15	CLB6	Capability analysis – Cp and Cpk	Exercise on capability analysis	Chapter 13 of the prescribed text
Taguchi design	20/10/15	CLB6	Taguchi loss function	Exercise on Taguchi loss function	Chapter 14 of the prescribed text
Final exam revision	27/10/15	CLB6	Revision questions for the final exam	Revision questions for the final exam	-

5. Assessment

Assessment task	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date, time, and submission requirements
Group assignment 1	Approx. 3500 words	25%	1, 2 and 4	Issue analysis, fact based data analysis and report writing skills	Midnight, Friday 11th September via Moodle
Group assignment 2	Approx. 3500 words	25%	1, 2 and 3	Issue analysis, fact based data analysis and report writing skills	Midnight, Friday 30th October via Moodle
Final exam	2 hours	50%	1, 2, 3 and 4	All course content from weeks 1-13	Exam period, date TBC

In order to achieve a PASS (PS) in this course, you need to achieve a composite mark of at least 50. Note that a 'double-pass' is not required for this course.

The details for the assignments will be communicated to you in class and provided on Moodle as the course progresses. You will be given approximately 5 weeks to complete each assignment.

Assignments

Group forming

By Friday of Week 2, at 5pm, you will need to self-enroll into a group on Moodle. Each group is set to consist of four to six members. Instruction to the self-enroll system can be found on Moodle by Week 1. Please note that any students who are not enrolled in a group by Friday of Week 2, at 5pm, they will be automatically assigned to a new group.

Presentation

All submissions should have a standard School cover sheet which is available from this subject's Moodle page.

All submissions are expected to be neat, and clearly set out. Your results are the pinnacle of all your hard work. Presenting them clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Submission

Late submissions will be penalised 5 marks per calendar day (including weekends). An extension may only be granted in exceptional circumstances. Where an assessment task is worth less than 20% of the total course mark and you have a compelling reason for being unable to submit your work on time, you must seek approval for an extension from the course convenor ***before the due date***. Special consideration for assessment tasks of 20% or greater must be processed through https://student.unsw.edu.au/special-consideration.

It is always worth submitting late assessment tasks when possible. Completion of the work, even late, may be taken into account in cases of special consideration.

Assessment Criteria

The following criteria will be used to grade assignments:

- Analysis and evaluation of assignments by integrating knowledge gathered in lectures, demonstrations and textbook.
- Sentences in clear and plain English—this includes correct grammar, spelling and punctuation.
- Correct referencing in accordance with the prescribed citation and style guide.
- Appropriateness of analytical techniques used.
- Accuracy of numerical answers.
- All working shown.
- Use of diagrams, where appropriate, to support or illustrate the calculations.
- Use of graphs, were appropriate, to support or illustrate the calculations.
- Use of tables, where appropriate, to support or shorten the calculations.
- Neatness.

Examinations

There will be a two-hour final examination at the end of the session. The final examisation will cover all material covered for the whole session.

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods, which are June for Semester 1 and November for Semester 2.

Provisional Examination timetables are generally published on myUNSW in May for Semester 1 and September for Semester 2

For further information on exams, please see Administrative Matters.

Calculators

You will need to provide your own calculator, of a make and model approved by UNSW, for the examinations. The list of approved calculators is shown at https://student.unsw.edu.au/exam-approved-calculators-and-computers

It is your responsibility to ensure that your calculator is of an approved make and model, and to obtain an "Approved" sticker for it from the School Office or the Engineering Student Centre prior to the examination. Calculators not bearing an "Approved" sticker will not be allowed into the examination room.

Special Consideration and Supplementary Assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, see Administrative Matters, available on the School website and on Moodle, and the information on UNSW's Special Consideration page.

6. Expected Resources for students

Prescribed textbook

The prescribed textbook for this course is:

Thomas, Foster, Managing Quality: Integrating the Supply Chain: International Edition, 5ed, Pitman, 2013. ISBN: 0273768255.

The prescribed textbook is available for purchase at the UNSW bookshop, and a number of copies can be borrowed from the UNSW library: https://www.library.unsw.edu.au/servicesfor/index.html

Each of you will be assigned to two major assignments with set of questions listed. These cases are published by the Harvard Business School. The case is copyrighted therefore you need to download it at a reasonable cost (around AUD $8.00) from their website.

Additional materials provided in UNSW Moodle

This course uses UNSW Moodle which list of assignments, answers to the numerical questions, suggested answers to case studies and assignments.

Logging on to UNSW Moodle using the following Web address: https://moodle.telt.unsw.edu.au/login/index.php

7. Course evaluation and development

Feedback on the course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

In this course, recent improvements resulting from student feedback include the changes in the length, submission procedures and presentation of the major assignments. Demonstration session hours have been extended to assist students with reinforcing their knowledge with exercises.

8. Academic honesty and plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism: https://student.unsw.edu.au/plagiarism The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here: http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Further information on School policy and procedures in the event of plagiarism is presented in a School handout, Administrative Matters, available on the School website.

9. Administrative Matters

You are expected to have read and be familiar with *Administrative Matters*, available on the School website: https://www.engineering.unsw.edu.au/mechanical-engineering/sites/mech/files/u41/S1-2015_Admin-Matters.pdf

This document contains important information on student responsibilities and support, including special consideration, assessment, health and safety, and student equity and diversity.

Erik van Voorthuysen
Ronald Chan
July 2015

Appendix A: Engineers Australia (EA) Professional Engineer Competency Standards

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (professional and lay domains)
	PE3.3 Creative, innovative and pro-active demeanour
	PE3.4 Professional use and management of information
	PE3.5 Orderly management of self, and professional conduct
	PE3.6 Effective team membership and team leadership